AARGnews 2

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Editorial

Is AARG, I wonder, turning into the "Aerial Archaeologists' Reunion Group"? There are very few new faces at our meetings and, more importantly, we have lost the small gaggle of research students who made up an interesting contingent in AARG's earlier days. All right - most of us have grown up and some have achieved positions in which (perhaps) they can no longer admit that they haven't a clue what to do with the aerial evidence (although I do remember that a lead in our past admissions of ignorance was taken by John Hampton when head of the English Commission's APU). This may also have some bearing on the meaning of 'R' in AARG. The forays into Europe by Musson and Whimster may eventually encourage research interests - but the initial problem in many countries would seem to lie in the acquisition of basic photographic cover. Thought and archaeological deeds may come later.

In this issue there is an appeal for information regarding research into crop circles. Most of us ought to be able to send fact or comment as requested whether coming from aerial observation or photo interpretation. Individual AARG members may be able to send snippets of information on these circles which, when combined, will produce a more credible answer (or super-question?) than has so far been proposed. If nothing else, we may be able to steer the Wessex Skeptics away from producing another of those wonderful books on photo misinterpretation as was written about Stonehenge (I L Cohen, 1977. The Secret of Stonehenge).

Contributions in AARGnews 2 range from doing it, to using it, to thinking about it. The use of microlight aircraft is written about by Ben Robinson, a Cambridge-based pilot who I met when he took some superbly lit obliques of a village earthwork site the day after I (thought I) had finished mapping it for a developer-funded project. Ben flies a tandem aircraft and is willing to take up a back-seat photographer. Chris Cox thinks that this may be the ultimate answer to air sickness....

On the 'using it' side we have Patrick Nagy's article in which air photography is but one technique used to examine an Early Middle Age village. Following my request, Patrick was good enough to work up his AARG 90 presentation for this volume as the twenty minutes or so allocated then was barely time for most of us to work out where Zurich was. The final three papers tend towards the 'thinking' side although all three writers have been practically active on aerial matters. We are fortunate, I think, that the theoretical side of 'real' archaeology has not yet discovered the aerial world and so our thoughts have some basis in reality. Or maybe our data are too complex for the theoreticians as well as ourselves. There is a logical progression through the three papers: my own is that which you would have heard at AARG 90 if I'd remembered what I wanted to say! In turn, this persuaded Richard Hingley to write his own views on the analysis of aerial material, while John Hampton's contribution tends to take an overview of the recent past and to give us some directions from which to consider some of the presentations to be given at AARG 91.
Chairman's Piece: an Italian Adventure

Chris Musson

A feature of our York conference last September was the increasing participation of aerial colleagues from the Continent, one whole session being devoted to projects from France, Germany, Switzerland and Belgium. Since the conference, your Committee has considered ways in which these links could be fostered and developed, not least of course by encouraging archaeologists from mainland Europe to join AARG and attend our annual meetings. We even considered the possibility of holding our 1992 conference on the other side of the English Channel (or North Sea), but decided that this might advance our Continental ambitions at the expense of 'home' members, some of whom might be deterred (or find themselves debarred by their employers) because of the extra time and cost involved.

More appropriate, we thought, were various ways of encouraging individual or 'semi-official' attendance by AARG members at Continental events; international meetings, for instance, are planned for Amiens, Padua and no doubt elsewhere over the next two years). The cost, of course, would fall on the individual members or their employers (which might call for some persuasive talking by the people involved) since AARG is not in a position to pay for its officers or other representatives to undertake activities - whether 'jolly' or otherwise - at the expense of the rest of the members.

As an organization, however, we should surely aim to have members present and ready to speak for us at Continental gatherings of aerial archaeologists whenever and wherever they occur. Partly this is a case of keeping an ear to the ground (an odd posture for an aerial archaeologist?) so that we know about such meetings, partly of persuading our employers, bank managers or spouses that it is essential, in the long-term interests of aerial archaeology, that we go with one or more colleagues by clapped-out minibus or economy-class airliner to Italy, Poland, Copenhagen or wherever the next meeting might be.

By chance - or rather by virtue of Philip Barker's praises for British aerial archaeology when in Italy a year previously - Rowan Whimster and I enjoyed an opportunity to carry this idea into practice and to put the case for active aerial work at a summer-school (well, winter-school actually) in Tuscany this January. Promoted by the University of Siena, the meeting was one of a series held over the past three years (and perhaps for another two more) for the benefit of working archaeologists, university staff and students from throughout Italy, in order to discuss topics of general concern - this year 'the archaeology of the countryside'. Between us we described the basic conditions for aerial work in Britain, the ways in which work is organized and funded, the broad impact that aerial observation has had in a number of fields, and the policies in hand to achieve full integration of the aerial perspective in record work, research, presentation and heritage management.
The basic message - that local archaeologists needed to get up there and 'do it' themselves - was fairly striking, it seemed, to archaeologists who have been kept earthbound (till now) by military or bureaucratic restrictions and who have (if exploiting the aerial view at all) done so only by scouring available vertical photography or by fairly fruitless (but obviously self-absorbing) attempts at image-enhancement on verticals often taken many years ago.

Over the week that we were there, an initial scepticism amongst the delegates was steadily eroded, with progressive appreciation that we were saying they themselves must find the ways in which aerial survey would produce information relevant to them in their own conditions of climate, agricultural regime and crop development. If we were able to assist in any way, of course, by further visits to Italy (or elsewhere) the privation could no doubt be endured.......!

In the event, the penance may not be long delayed. Rowan was quickly propositioned by a professor from Seville, with a view to giving a series of talks that would encourage the establishment of active programmes of aerial survey in Spain. I myself was asked to help in promoting aerial work for a research project on the Campagna, in Italy. A potentially invaluable contact was made with an aerially-inclined colleague from Yugoslavia, where the opportunities appear golden, the demise of Communism having left a dearth of bureaucracy to inhibit innovations in this field.

Finally, both of us were invited to help our host, Professor Riccardo Frankovich, in setting up active recording and aerial research in Tuscany (military and other red tape permitting). Having seen Riccardo’s capacity to extract money from sponsors for the school itself, we have little doubt that in due course we will be seeing more of Tuscany, perhaps from a little higher up. Hopefully, too, our new-found Italian, Spanish and Yugoslav friends will themselves come to Britain, to learn from our experience - and our mistakes - in aerial work (and to meet other members of AARG at our annual conferences).

All in all this Italian adventure was a thoroughly worthwhile undertaking. With any luck it will be only the first in a growing series of exchanges between AARG members and their Continental colleagues. What was that I heard someone say? Poland? Russia? Mongolia?
Using the Microlight Aircraft
for Archaeological Air Photography

Ben Robinson

Microlights owe their origin to the quest for affordable, safe powered flight; a quest which began during the pioneering days of flight and reached a pinnacle during the 1920s and 1930s, a period of popular flying typified by aircraft such as the cheap and eerily uncomplicated Pou-du-Ciel or "Flying Flea". The potential aviator could construct the machine in his garage during the winter months and by summertime may have become airborne alongside the more affluent flyers. Unfortunately the idea was ahead of the technology and materials of the day, the poor reliability of most of the aircraft causing them to fade into obscurity before the outbreak of the war.

During the immediate post-war years powered flying was again the preserve of the moderately wealthy, ex service types slowly being replaced by purpose built light aircraft such as those of the Cessna range. It was not until the space race gave birth to the "Rogallo" wing, an offshoot of the search for re-usable spaceship re-entry systems, that hanggliders were born and with them the idea of obtaining longer flights by strapping a small engine and propeller on to the wing. This was the forerunner of the microlight whose dacron and aluminium technology burst onto the scene in the late 1970s, their evolution since then has been rapid.

A microlight today, as defined by the Civil Aviation Authority, is " A one or two seat aeroplane whose maximum total weight shall not exceed 390kg at take-off and whose wing loading at maximum total weight authorised shall not exceed 25kg per square metre nor shall the fuel capacity exceed 50 litres."

This law whilst defining boundaries does allow for some quite remarkable and diverse designs. The most popular forms in this country are those based on variations of the hanglider's "Rogallo" wing principle, called "Weight-Shift" machines or "Trikes". Here control is achieved by moving a control bar directly attached to the wing, this has the effect of shifting the mass of pilot, engine and undercarriage in relation to the wing, therefore affecting the changes of balance necessary for climbing, turning and descending. It sounds a precarious and strange system but is in fact very stable, and once mastered feels very natural. There are many microlight designs based on the conventional stick and rudder system, some even taking the form of mini replicas of famed light aircraft.

The engines mainly used are water- or air-cooled two-strokes, ranging from 250cc to 600cc and running on a petrol-oil mix (50:1 is usual). Four-strokes are rare but growing in popularity. Instrumentation need not be any more complicated than airspeed indicator and altimeter though many consoles now resemble Tornado cockpits - it's a matter of personal preference.
The weight limitations imposed on microlights do not encourage enclosed cockpit designs, though some exist, most simply have a small fibreglass or plastic "pod" and windshield mainly just for a more aerodynamic and neat appearance. Trikes in particular then have excellent all-round downward views, no need for opening doors, violent banking or shooting through perspex when photographing the ground. The field of view obviously becomes more restricted when a passenger is taken, more of a problem for the rear seat of a tandem arrangement than in side-by-side types.

Most microlights will have ample suitable positions for fixed cameras, though before drilling holes for fixtures it is worth noting that everything on a microlight usually has a function or is there to take a load, and that even minor modifications to the airframe may be illegal. I prefer the flexibility given by operating the camera by hand, in most weather conditions only one hand is required for control (both foot and hand throttles are provided on trikes) releasing a hand to operate the camera. I know of other solo flyers who mount the camera in gadgets which allow them to be steadied by gripping a bar between the teeth.

The type I fly, of the trike configuration, has a maximum safe airspeed of 80mph and will "stall" below around 25mph (depending on weight and attitude etc), therefore flying into a stiff breeze can result in incredibly low speeds over the ground. This can give you ample time to set up and take the photographs, and allows stereo shots to be comfortably taken with manual wind-on, even at low altitude. It also eliminates the need for repetitive over-flying of the site, particularly useful near to housing; I have noticed that people are more likely to notice and therefore complain about microlight nuisance flying than light aircraft or fast jets, despite their comparatively low noise levels.

The absence of any effective protection from the airflow in most types means that in flight film changing can be a bit of an ordeal. Loose articles such as film rolls are a potential hazard for the "pusher" configuration trike, anything dropped has a good chance of flying through the propeller and ending the powered phase of the flight! Engine failures and smashed props are not as horrific as they sound, fair glides can be achieved and all pilots are trained thoroughly to deal with the eventuality.

Flying can be uncomfortably cold during the winter months without the correct clothing. Most pilots buy purpose made one-piece insulated suits, and wear ski-type gloves or mittens, obviously affecting the ease with which you can fiddle with the camera. I have a pair of insulated mittens permanently fixed to the control bar which allows me to use bare or thinly gloved hands to operate the camera, returning them to the mittens for thawing out. The amount of time my hands are outside the mittens is proportional to the air temperature, consequently pictures taken on the coldest days of winter may have a slightly hurried look about them! In summer, bare-handed minimally clothed flying is possible. Most pilots of open cockpit types wear a crash helmet despite the fact there is no legal requirement to do so; types range from the sophisticated military style with intercom to open-face motor-bike helmet and goggles. Selecting a style which allows for easy photography is not a problem.
Due to the improved strength and performance of modern microlights it is possible to fly in conditions closer to those which limit even light aircraft, though obviously these limits are ultimately defined by an individual pilot's competence and confidence. On very turbulent summer days which do not allow for one-handed flying, I prefer to take my photographs in the morning or evening, the lower light enhancing earthworks. As already mentioned the wind strength and direction has a greater effect on microlights than most light aircraft, it may therefore take a little longer to reach sites or cover an area. Although fuel capacity and therefore range is limited (25 litres of fuel will take me nearly 150 miles in still air, though the range will be halved flying into a 25mph headwind) the microlight pilot has a far greater choice of landing and take-off sites, very long journeys can be broken into stages. A growing number of light aircraft aerodromes now welcome microlights especially since many now carry radios, while there always remains the option of operating from a suitable field or beach, after obtaining the owner's permission. Most microlights can be de-rigged to a form which allows them to be towed on a trailer behind a moderately-sized car, the time taken to rig and de-rig depends on the type and amount of practice; 30 minutes is typical.

A new state-of-the-art microlight will cost between £8000 and £15000, kits for homebuilding will half the cost. There is also a thriving "used" market, where very good machines can be obtained for £5000 or under, some can be bought for under £2000. Operating costs are low when compared to light aircraft. Typically around 2 gallons of fuel are used per hour, engine maintenance costs compare with those of large motor-bikes, though for safety reasons servicing is much more frequent (every fifty hours or so). Wing or airframe maintenance is nearly always best left to the manufacturer but because of the standard materials and simple configurations used, costs seldom approach those of comparative maintenance on light aircraft. A microlight now requires a "M.O.T" taken every six or twelve months (depending on it falling into one or other of two categories), the machine is examined by an improved examiner and test flown, the issue of a this certificate of airworthiness will cost under £50. Membership of the British Microlight Aircraft Association, the sport's regulating body, costs £25 per year, individual microlight clubs have varying yearly fees depending on the facilities available, a few pounds for clubs without a good site, to around £100 for those with the most to offer. Costs other than the above, for example permanent hangarage, are purely a matter of personal choice.

The archaeological air photographer who wishes to use microlights, and who doesn't have a friend who flies one has two options, the first being to take the required Private Pilots Licence course and become a pilot, (or conversion course if already a PPL holder) at an approved school, which is of a similar format to light aircraft PPL training. The second is to hire a qualified instructor as the pilot; the law limits the commercial use of microlights to training purposes only there being no microlight equivalent of a commercial pilot's licence.
Microlights have shaken off the image of the early days as lawnmower engines strapped to hangliders, and with improved standards of design, manufacture and pilot training have attained an admirable recent safety record. Their use by the military and in expeditions to the far-flung corners of the world (microlights have flown across the Atlantic and to Australia) increase the claim that microlights have to being taken seriously in the aviation world. Their potential for reducing the cost and increasing the versatility of the air interpretation of archaeological sites is now apparent.

Is your Negative File PVC?

Anthony Crawshaw

If your negative, or slide, file is made of PVC or other chlorinated plastic your photographs are at risk. Since the harmful agent is a gas, given off by ageing of the plastic, any photographs in the same enclosure may be harmed. Thus it is no use having archival file sheets in a PVC binder like the Paterson ones.

There is a simple test for PVC and the like. Take a piece of copper wire and strip off any insulation. Heat the wire in a flame until the flame ceases to be coloured. Touch the hot wire on to a corner of the plastic so that some melts on to the wire. Put the wire back into the flame and if there is a green coloration to the flame your plastic is PVC or one of its relatives. This test comes from the brochure of Secol Ltd, Howlett Way, Thetford, Norfolk, IP24 1HZ.

I've been using their negative file sheets, made from a polyester they call 'Transleeve', for about a year, but won't get any more. The reason is not their archival properties, for I look forward to sending them a letter of satisfaction in 2091, but problems in usage. The difficulty is that the file sheets charge up any negative strip that you remove from them. The strip then picks up any nearby dust in a most efficient way. Dust on the negatives will (a) scratch them, and (b) appear on the prints.
Reconnaissance and Post-reconnaissance in Ireland: 1989 and 90

Brian Williams sent questionnaires to those involved in aerial work in Ireland and the few replies received were passed on to the AARGnews editorial staff. Brian has promised a paper on the history and current position of aerial research in Northern Ireland for AARGnews 3 so the following may act as a 'trailer' and allow many of us to find our way around Irish place names. The map condenses the information below and distinguishes areas of photography and mapping.
Reconnaissance:

Co. Wexford
Michael Moore
Office of Public Works
Dublin
325 B&W

Co Galway
D D C P Mould
The Burren
Aherla
The Aran Islands
Co Cork
R Shannon
Co Cork
'several hundred'
col + B&W

Fermanagh
Gail Pollock
HMBB, DoE (NI)
800
col + B&W

Co Louth
Gillian Barrett
Co Meath, R Boyne and
Blackwater
Co Tipperary, R Suir
Co Wexford, coastal + R Slaney
Co Waterford, coastal
Co Kerry, Dingle Peninsular
The Aran Islands [1990]
Co Clare, The Burren
Co Dublin, N coast
R Shannon transect
parts of:
Cos Meath, Dublin,
Sligo, Leitrim,
Mayo, Longford, Kildare, Wicklow

Post-reconnaissance:

Co Down
Lucia McConway
Mapping from
Co Armagh
HMBB, DoE (NI)
1:10000 verts
Co Fermanagh
(binocular stereoscope)
1989 area
Gillian Barrett
'Located on'
Wolverhampton Poly
1:10560 maps'

Co Louth
Gillian Barrett
Selected sites and
R Nore and
landscapes at 1:2500 via
Barrow transects
AERIAL

Co Kerry
Katherine Daly
Mapping from
Office of Public Works,
Dublin
?1:30000 verts
1:10000/10560
(Wild APT1 stereoscope)
Continued Aerial Vomits: responses and suggestions

Chris Cox

The response to my note in AARGnews 1 about airsickness was most encouraging. It is important to discuss the problem and find a range of solutions and preventative measures, because airsickness affects a large percentage of people who fly as passengers in light aircraft. Many people are put off flying due to sickness experienced on their first flight, and the embarrassment this causes when the flight has to be curtailed. Such people may never fly again, not through fear of flying, but through fear of sickness. When I learnt to fly, I found that the airsickness gradually got better as I was able to take control of the aircraft, and be in charge of the flying and the cabin heating and ventilation. The problem occurs whilst flying as a passenger.

The following observations and suggestions are derived from discussions with aerial photographers at AARG in September 1990, my own experiences, and conversations with doctors, flying instructors, and private and commercial pilots.

During photographic flights, the photographer and observer may be affected, particularly during transit between sites, or as a direct result of the steep turning needed for successful oblique photography. All agree that inactivity increases the chance of feeling sick. I never feel ill whilst actually piloting the aircraft or taking photos.

Most people agree that the cause is not psychological. I have found that 'not thinking about it' is an inadequate preventative measure (always suggested by people who never feel airsick). Several physical causative factors have been identified, and ways of altering or avoiding these are suggested.

The smell of fuel in the closed cockpit whilst still on the ground can induce nausea in susceptible people. The aircraft should not be over filled and be well ventilated after fuelling. This is a common cause of sickness for student pilots and newcomers to aviation.

Inadequate ventilation during flight often causes sickness, but a balanced environment which pleases both pilot and passenger can be agreed, by politely requesting that the cabin air be left on, and heat reduced. I really enjoy photography through the open window, tend to leave the window open for long periods, and look forward to reconnaissance in a doorless aircraft, but the pilot often justifiably complains of the cold.

The aerial photographer spends considerable time looking out of the aircraft window and observing the 'moving' landscape. Switching attention from this to concentrate upon 'static' objects within the cockpit whilst the aircraft is in motion can result in the brain becoming confused. Sickness is often the result. Keep looking outside (you might see a crop mark!), and try to fly with an observer who can map read, change film etc. The ideal team of pilot,
photographer and observer ensures division of duties, and frees the photographer to concentrate on looking out of the window and taking the photos, an activity which usually banishes sickness. I found that the large magazine backs which can be obtained for most cameras helped tremendously, freeing me of the continual film changing which often made me feel ill.

Sudden changes in aircraft direction or attitude create considerable positive or negative G forces which can feel awful, even to an experienced pilot. Steep turning can be achieved smoothly in calm conditions, and is necessary for good photography. The pilot's ability and handling technique are important factors, and if the pilot realises that you may be prone to sickness, aircraft handling can be modified to take this into account. This is discussed further below. With constant practise and long exposure, you will eventually get accustomed to the changes in G force which cause illness, but most of us do not fly frequently enough for this to happen.

After accounting for the above factors, and trying to improve the ventilation and adjusting working practices as suggested, some people, myself included, may want to use travel sickness medicines. Some are useless, others cause drowsiness, so it is advisable to try them out on an unimportant flight, or before you have to drive. The following remedies have been suggested to and tested by me, and are effective most of the time without causing drowsiness:

'Superpep' chewing gum. This was supplied by Otto Braasch, and I have used it a lot. A small amount of medication is absorbed continually through the mouth lining directly into the bloodstream. It is convenient to carry, tastes OK, and can be used either continually or at the first sign of illness. I have experienced no drowsiness and no impairment of driving ability. It is useful to give to nervous passengers who fear that they might be sick. This cannot be bought in the chemist, but it, or its English equivalent can be obtained on prescription.

Buccastem. A similar preparation to Superpep, again available on prescription. A small tablet is placed in the mouth between the gum and lip, where it slowly dissolves and is absorbed. I did not find this to be as effective as Superpep, and it tasted unpleasant.

The advantage of these two drugs is that the dosage is low, and the effect is reasonably immediate. A GP may also have other suggestions - mine was most interested and helpful, agreeing that the orally absorbed preparations were safest, particularly when driving a car after flight.

A low blood sugar level can contribute to feeling sick, therefore a light meal beforehand is recommended. I also find mints or boiled sweets (but not chocolate) to be helpful, particularly on long flights.

Having tried acupressure wristbands, with no apparent success, I cannot really comment on their effectiveness, only to say that they got in the way of the camera strap and cost a lot of money.
Herbal remedies are available, but are also expensive and often have to be taken in advance, and the types which I have tried tasted vile and been totally ineffective. Raw root ginger has been used and is highly recommended, simply chewed in small pieces during flight, but I haven't tried it yet.

Many people are still reluctant to discuss the problem with pilots and colleagues, but admission of airsickness will often bring help, and can lead to the total disappearance of the problem. The relationship between pilot and photographer is an important one, and having found a good survey pilot, a passenger who is likely to feel ill, and knows the causes, can always simply tell the pilot and ask for suggestions. A good pilot should never laugh or deride the passenger (after all, we are paying for this!) but seek to help if possible.

As mentioned above, the observer can take on tasks which cause sickness, and support the photographer in suggesting changes in ventilation or cabin heating. This communication factor is very important, and is the reason I decided to discuss this problem initially. I once thought it would be impossible to learn to fly due to sickness, but through discussion with a flying instructor, the problem was overcome. Flying and photography were a little more difficult, but possible through the co-operation of pilots and observers who had experienced this themselves at some time, and were willing to help.

If you are susceptible to airsickness, it is sensible to simply face this fact, and be prepared to be sick if necessary, which often results in you feeling better and being able to carry on and do more photography instead of wasting the flight. A commercial pilot will be justifiable displeased if the aircraft is put out of action by a messily vomitous passenger. A strong carrier bag with handles to tie it up afterwards should always be available. Being sick out of the window is not an option, as the stuff rapidly reappears in the cockpit due to the aircraft’s slipstream. A sense of humour is also an advantage (afterwards).

There will always be some people who are too severely affected to fly, but these are in the minority. Regularity of flying experience and understanding of the technicalities of flight reduce the sickness. I have flown over 300 hours as a passenger, and 200 as a pilot, and although still affected, the ability to cope with airsickness increases, and the severity of the feeling decreases over time if the problem is recognised and treated effectively. Any further comments on this matter will be welcomed.
Unterstammheim-Äpelhusen, a Deserted village
in the northern part of the canton of Zurich:
first results of our aerial photography project

Patrick Nagy

The aerial photography project in the canton of Zurich was started in 1988 to get a more completed inventory of new archaeological places because of increasing destruction by intensified farming and constructing. The cantons of Thurgau, Schaffhausen, Lucerne, Aargau and Berne are also involved and others will be, sooner or later.

O. Braasch, who takes the aerial pictures, has photographed over 800 possible archaeological places in the past two years (fig.1). By the immediate interpretation of the pictures and completing field work many new archaeological sites (from palaeolithic times to Middle Ages) could be protected by conscribing them in archaeological zones. So our archive with ca. 4200 known places will immensely increase in the next years.
The canton of Zurich is situated in the eastern part of Switzerland from the Rhine in the North to the beginning of the Alps in the South. The area covers 1728.63 km² (i.e. 4.29% of Switzerland); with 1145522 inhabitants in 1989 (ca. 16.6% of Switzerland) the canton of Zurich is the most densely populated of the whole state with an increase in about 400% since the middle of the last century. The increase in the population varies between the different regions of the canton. 1377.79 km² (79.7%) of the territory are productive area with fields and meadows, fruit- and vineyards and forests. The rest are unproductive areas like rivers, lakes, dwellings etc. 768 km² (44%) are agriculturally used. The meadows and pastures are mostly found in the humid and hilly parts of the canton, where it is difficult to do prospecting work because one can get crop marks of grass only in very dry seasons. Barley, which is most suitable for crop marks, is rarely cultivated; grain covers about 60% of the agriculturally used land. Unfortunately maize gets an increasing importance (by now 17% of the agriculturally used area) (fig.2).

Because of the high portion of grain the best results of aerial photographs can be made in May, June and July, so all flights were done in this time of the year. But to get other sorts of marks too, Mr. Braasch will fly also in the rest of the year.

The valley of Stammheim (fig.3) is situated in the north-eastern part of the canton of Zurich (district of Andelfingen) at the bottom of the "Stammerberg" (LK 1032 701 500 / 279 850). The north-south orientated valley connects the Rhine valley to the Thur valley. In the north the "Rodenberg" at Schlattingen obstructs the way to the Rhine. The valley of Stammheim is an almost intact agricultural area, but there were big changes by the extensive melioration done in the last hundred years. Increase in production, rationalisation of farming work and consolidation of estate had changed the impression of the landscape. Most of the valley is cultivated with grain, sugar-beet and potatoes, which are fairly good conditions for aerial photography; beside this hop and tobacco are of some importance and forests cover the hills.
Climate:
The territory of the canton of Zurich is divided in many small regions which have different climatic conditions. The canton of Zurich belongs to the suboceanic, cool-temperate transitional climates. The canton is divided by the precipitation in the temperate north with 800-1000mm/year, a moderate zone with 1000-1200mm/year, a humid zone with 1400-600mm/year and a very humid zone in the southern part with 2000-2400mm/year. Because of these conditions aerial archaeology in the southern parts will be successful only in very dry years while in the northern parts there are no problems to make good photographs. To the driest and warmest zone of the canton belongs the valley of Stammheim. The precipitation amounts to 800-900mm/year. (fig.2).

Swamps and reed:
Characteristic for many parts of the canton of Zurich are landscapes with lakes and pools formed in late glacial and postglacial times, many of them developed to swamps in time. In 1910/1915 6-15% of the productive area were swamps and reed. The productivity of farming was increased by an elaborated melioration program: from 1898 till 1975 80% of the agricultural land were improved by melioration. Today most of the remained swamps are protected by conservation. Also in the valley of Stammheim there are just some little swamps.
(for example the "Etzwiler Riet") remaining of the big areas which once covered the valley. On some of the aerial photographs the drainage systems are visible. On a map from 1667 (the so-called "Gyger-Plan" (fig.7)) there is drawn in a "Stammer Weiher", which is also verified by calcareous mud in drilling profiles. The settlement of "Eppelhusen" is on the southwestern shore of this old pond. The field "Emdwiesen", on which dwelling structures are seen at the aerial photographs, is situated at 435m above sea-level, clearly over the moist bottom of the valley.

The soils:
The different climatic, topographic and geological conditions resulted in different types of soils. In the canton of Zurich there are four principal pedological types of soil:
- Parabrown soil is mainly found north of the Thur valley in the dry region, mostly on glacial gravel and loose moraine deposits. This is the most valuable soil for agriculture, used for grain, fruits and vegetables.
- Brown soil is found between Winterthur and the Thur valley and also between the valleys of the Töss and the Glatt. It is most suitable for grain, feed-plants and vine.
- Pseudogleying Brown soil is mostly found in hilly regions on morainic gravel deposits and molasse layers, mainly in the south-eastern parts of the canton. This areas are used to cultivate feed-plants.
- Pseudogleying, acid Brown soil is found in the mountainous parts in the south-east on morainic deposits and molasse layers. Most of this parts are used for pasturing.

The other types of soils are of less importance (fig.4).

The bedrock of the field "Emdwiesen" consists of fluvio-glacial gravel deposits, which are deposited on talus, valleys and plains once covered by glaciers of the Würm. The type of soil is Parabrown soil which can easily be grown through by plants, contains few pebbles, can store only water in a moderate degree and is permeable to water in a very high degree.

The aerial photographs taken by now are mostly of the regions with Brown soil and Parabrown soil, but it doesn't mean that only this soils are suitable for aerial archaeology because we first have to get more pictures from other areas before to make such a statement.
The landscape is strongly formed by the Würm glaciation with morainic ridges, U-shaped valleys, drumlins etc. In the last glaciation the whole valley of Stammheim was covered by the Rhine glacier. Only in the highest parts of the hills some remains of the Mindel glaciation are found. Below the glacial gravel deposits the ground consists of Upper Sweetwater-Molasse, which appears on surface at some spots. Post-glacial transformations are rare.

Prehistory and early history:
The prehistoric settlement of the valley of Stammheim begins in Neolithic times, testified by isolated findings (stone axes, silices). Settlements of these early times (and even older from the Mesolithic) are known from the shores of the Lake of Nussbaumen in the east of the valley of Stammheim (most of them on the territory of the canton Thurgau). While the Bronze Age is well represented by settlements and graves, there are no signs of any Early Iron Age remains; nevertheless there are good chances for a continuance to the Roman period, which is represented by several isolated findings. Many burials of the Early Middle Ages from Oberstammheim are connected to the first historical sources in this area. Stammheim is first named in a document from 761 AD, Ober- and Unterstammheim are separately stated in 1212 AD. It is assumed that the Early Middle Age settlements are concentrated on the border of the valley while the bottom of the valley wasn't settled. Stammheim and Äpelhusen are assumed to be of younger age.

The area of the fields "Emdwiesen" and "Äpelhusenhof" have also delivered prehistoric findings, in the northern part a stone axe maybe of Neolithic age and ceramics assumed to be Roman. In 1916 a stone construction, bones and bronze objects were found, maybe the remains of a Bronze Age burial. Other stone structures of round and oval shape in the same area could neither be dated nor interpreted, although there was found a handle of a bronze vessel nearby, maybe of late La Tène period. At the "Blutbuck" a Bronze Age D burial was discovered in 1844; a sword of unknown shape and date was also found nearby but is now lost. A human skull ploughed up in the early last century had no dating findings with it. Earlier excavations on the "Stammerberg" brought no clear structures nor datable findings (fig.5).

The settlement of Äpelhusen:
In July 1988 the structures seen in fig.6 were discovered in the field of "Emdwiesen" (community Unterstammheim ZH) by O. Braasch. They are interpreted as the remains of the deserted settlement of Äpelhusen, known from historical sources to be located in this area. The settlement is situated on a flat ridge orientated from west to east. In the north the place is limited by a steep slope. The settlement occupied an area of c. 250 x 100 m, but could be wider to the east, west and south, while the boundary in the north seems to be seized because of the old "Stammerweiher" (today "Etzwiler Riet"). It is not clear at the moment if other remains in the southwest are connected to the settlement or not. On the pictures some pits and dwelling structures are clearly visible, but the exact number of them is not determined until
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- Single finding
- Settlement
- Grave
- Tumulus
- Hillfort

Neolithic : 3
Bronze Age : 4 / 5 / 6 / 7 / 13 / 15 / 17
Iron Age : 1
Roman Time : 2 / 8 / 14
Early Middle Age : 10 / 11 / 12 / 18 / 19
Unknown : 9 / 16
now. There are many rectangular structures (about 2.5 - 5 x 5 - 10 m), some of them west-east orientated. They could be the remains of pit-houses. Other structures are spread promiscuously over the area, some of them could be post-holes of wooden dwellings or waste pits.

The beginnings of the settlement are unknown till now. The earliest sources are dated in the 9th and 10th century. In a document of 868 the place is called "Appilinhusun", in 888 "Appilinhusin" and 962 "Apilehusa". During the times the spelling has often changed. On the "Militärquartierkarten", drawn by H.C. Gyger in 1660, a settlement "Eppelhussen" is situated on the eastern shore of the "Stammerweiher" (fig.7). It is said in the historical record that a farm "Äpelhusener Hof" burned down completely in 1832 and wasn't rebuilt. It is not clear if this farm (and also the settlement on the map of 1660) is situated on the field with the structures seen on the aerial pictures (e.g. the field today called "Emdwiesen") or in the field east of it called "Äpelhusenhof" on present maps. Besides, it is proven that field-names are often changing their exact location during the times.

First field-walking on the place was done in autumn of 1990 in the south of the area. The ceramic findings are dated only to the High Middle Ages (13th century) and later, while the older periods mentioned in the sources are not represented. The large amount of modern
sherds has not to be connected to the settlement but can be the result of today's depositions by the farmers. So the beginnings and the end of the settlement are not documented by findings.

FIGURE 7

While investigations of deserted villages in the canton of Zurich are rare, in the territory of the neighbouring canton of Schaffhausen there are some sites with similar structures partly excavated, which can be well compared to our settlement. One of these is the village of Berslingen which was excavated from 1968-1970 (Guyan 1971,187-212). The beginnings of the settlement are also in the 9th century (846), the end is dated in the 13th century. Aerial photographs show a similar confusion of pits of different shapes. In Berslingen also a chapel built in stone and a graveyard were found, all the other dwellings were built of wood.

Further projects:
Because of the interesting historical situation and the aerial photographs an investigation project is planned by the Department of Archaeology, in which different methods of prospection (geoelectric, magnetic, drilling, phosphate analysis etc.) will be used and compared, finally verified by excavations.
Bibliographie

E. Akeret et al.: Das Zürcher Weinland - Geschichte und Landschaft (1987)

W. Bachmann: Der Einfluss von Bodenverbesserungen auf die wirtschaftliche Struktur eines Gebietes Diss Uni Zürich (1949)

H. Bernhard: Landbau und Besiedlung im nordzürcherischen Weinland Njbl der Stadtbibliothek Winterthur 1915 & 1916 (1915)

O. Braasch: Luftbildarchäologie in Süddeutschland (1983)

R. Christlein / O. Braasch: Das unterirdische Bayern (1982)

J. Escher / P. Schweizer: Urkundenbuch der Stadt und Landschaft Zürich Bd.1 (1888)

A. Farner: Geschichte der Kirchgemeinde Stammheim und Umgebung (1911)

P. Fitze: Neue Hypothesen zur Bodenbildung auf Quartärablagerungen der Nordostschweiz Geographica Helvetica 42,1987, Heft 2, 117-122


Landwirtschaft im Industriekanton
Die zürcherische Landwirtschaft hrsg. Dir. der Volkswirtschaft des Kantons Zürich (1976)

Landwirtschaft

D.N. Riley: Air Photography & Archaeology (1987)


K. Wanner: Siedlungen, Kontinuität und Wüstungen im nördlichen Kanton Zürich (9.-15. Jahrhundert)
Geist und Werk der Zeiten Nr.64 Arbeiten aus dem Historischen Seminar der Universität Zürich (1984)


D.R. Wilson: Air Photo Interpretation for Archaeologists (1982)
Developer Funded Aerial Archaeology:  
the north west ethylene pipeline

Chris Cox

Developer funded aerial survey often requires a completely different working method to the more usual 'landscape' based archaeological research project and has challenged many of my own long established ideas and ideals of aerial archaeology.

This note summarises the report which I presented at AARG in September 1990, describing aerial survey in advance of pipeline construction in north west England.

In 1988, Lancaster University Archaeological Unit (LUAU) was commissioned by Shell UK Exploration and Production to undertake a phased archaeological assessment of the English section of the proposed route of the North West Ethylene Pipeline (NWEP) as part of a wider assessment of the environmental impact of the pipeline route (figure 1). The area under evaluation was 400m wide, and 240 km long. This included a 40m wide central zone through which the pipeline will be installed, being the priority area for archaeological investigation. The aerial survey covered the 400m width.

The proposed route of the NWEP in England passes through varied types of terrain. These include the upland mainly pastoral Northern section from the Scottish border to Lancaster, the low lying wetlands of the Fylde, and the marshes of the River Ribble estuary. The route continues through the flat and arable Lancashire plain with its mix of peatlands and Shirdley Hill sands, the urban central Lancashire coalfield, to the refineries and chemical industrial complexes at its termination on the South bank of the River Mersey at Stanlow.

Figure 1.
The archaeological survey was carried out in 3 stages. Desk based SMR searches preceded field and aerial survey within the 400m corridor, which in turn was followed by detailed survey, preservation by re-routeing the pipeline, or excavation of selected sites within the 40m corridor in advance of construction. The results of the archaeological survey were submitted to the contractor in a series of time-scheduled reports, incorporating recommendations for re-routes and excavation budgets at the pipeline planning stage.

I began work for LUAU in mid February 1990 as the aerial archaeologist for the NWEP project. The contract required new reconnaissance of the 400m pipeline corridor for archaeological purposes, and interpretation of new and existing photography. All aerial photographic evidence was mapped using the Bradford Aerial Photographic Rectification System where possible, and output at 1:2500 to be compatible with the field survey data and for incorporation into composite maps which were used for archaeological evaluation.

I began the aerial work with an archive search to establish the extent of the existing oblique and vertical coverage. Enquiries at CUCAP and RCHME produced very few photographs covering the exact route. This was due not only to the narrowness of the pipeline corridor but also to the fact that there are few ‘obvious’ sites to catch the attention of previous roaming photographers, particularly in the southern area of the route. Some relevant areas had been covered by Bob Bewley (RCHME), Tom Clare (county archaeologist for Cumbria), and Adrian Olivier (LUAU) in previous years as part of the general aerial reconnaissance in Cumbria and Lancashire supported by RCHME grants, and their obliques were helpful, particularly as the NWEP flying had to be completed before the summer, and some of their prints showed sites as crop marks, which I would otherwise not have seen during my own springtime reconnaissance. The site shown in figure 2 was recorded by both CUCAP and Tom Clare as a crop mark while my own photographs, taken in April, showed very few features which had not been surveyed on the ground. A combination of all three aerial sources and ground survey were used to make up the final map.

A 1:10 000 black and white vertical survey had been commissioned by the contractor who retained the prints in London where I consulted them once, after completion of my own aerial reconnaissance. I looked at the whole run stereoscopically, and saw some, but not all, of the sites which I had already found and photographed over the past two months. I added four sites to the maps from these verticals, which also aided interpretation of the landscape, and confirmed my interpretation of several natural features which could have been mistaken for archaeology. I also consulted verticals taken in 1974 by the Potato Marketing Board, covering the Fylde area between Lancaster and the M55 motorway. These prints were very dark, but aided interpretation of my own obliques. There was not sufficient time available to consult RAF verticals.

Aerial photographic survey was carried out concurrently with field survey of the pipeline corridor by LUAU archaeologists.
The field survey team was granted access to the land through a land agent employed by the contractor. Written permission was required for field walking and survey, and was granted for a short and specific time per site. This situation required a great deal of co-ordination and organisation, and some areas were not surveyed at the initial evaluation stage because access to the land was, for varying reasons, impossible.

Aerial reconnaissance provided the only complete and unrestricted survey of the pipeline route.

The rigid time schedules, which are a necessary part of any developer funded evaluation, were a major constraint to the aerial survey, which begun in March 1990. This situation required a modification of tactics, standards and expectations to take full advantage of the opportunity to record the aerial evidence from a narrow transect of land passing through all terrain types encountered in the north west and containing rich and varied archaeological information.

Our contract required the first evaluation and major report by the beginning of May 1990, including photo interpretation and mapping of both new and existing aerial coverage of the whole route. The recommendations put forward by LUAU at this stage led directly into the next phase of the project: detailed survey, excavation, and target orientated aerial reconnaissance.

I flew the pipeline route in several flights, taking any opportunity to fly. This often entailed flying in conditions not conducive to brilliant photography, but productive of adequate working photographs. If undertaking general reconnaissance over a whole year, I would normally be prepared to wait for suitable lighting and weather conditions to ensure high quality photos.

35mm and 70mm cameras were available, but the greater proportion of photos were taken with 35mm due to the speed with which the films could be processed in-house. The 70mm photos served as good illustrative material, particularly useful when presenting information to non archaeologists, or for display purposes, but were not processed quickly enough to contribute significantly to initial photo interpretation. Photos were taken as stereo pairs whenever this was possible.

I photographed anything which could be interpreted as archaeology in the broadest sense, from known prehistoric settlements, Roman forts and DMVs, to traces of post-medieval field boundaries. Many new sites were identified, and all known sites were recorded and sometimes reinterpreted in the light of new aerial evidence. The variation in both archaeology and landscape during the course of a short project was really interesting to me as an aerial photographer, providing some of the most challenging photographic conditions, such as recording sites situated on the steep slopes of the Tebay Gorge in Cumbria in sunny but turbulent conditions, or trying to find the vestigial earthworks of a known DMV in very flat and grey light from 1000 feet.

The pipeline had been routed away from scheduled ancient monuments, but there were still areas which need clarification, such as the possible site of a vicus adjacent to the Roman fortat Low Borrowbridge in the Tebay Gorge. My own photography showed some amorphous
hollows, but, when interpreted in conjunction with photos taken by CUCAP at a different
time of year, more features could be seen, although not enough to provide conclusive
evidence to back a recommendation of full excavation to the contractor. A trial excavation in
the autumn of 1990 showed Roman occupation on this site, which could never have been
proven in this case from the aerial evidence alone. In such situations it was most important to
be cautious when interpreting aerial photographs - it was adequate in the time available to
simply state that there were possible archaeological features showing on the photos, give their
location and a plot of their shape and extent, while not attempting to stretch the aerial
evidence to its limits.

Results had to be available promptly - photos taken on a Monday would be processed,
interpreted, mapped, possibly checked on the ground, and their information notified to the
contractor by the end of the same week. Due to time and budget constraints, I usually
identified and located sites from photographic contact prints, which I had never previously
contemplated doing. I then printed only those photos which covered the 400m corridor, unless
information lying outside that width helped interpret sites within it. This was difficult, but not
impossible to decide from the contact prints, and still led to a huge heap of prints to interpret
and map. The job was facilitated by another archaeologist, Malcolm Harrison of LUAU, who
helped to digitise my interpretation overlays, and the project draughtsman who "humanised"
the computer output and combined the aerial and ground survey evidence on the same maps,
differentiated by colour coding. I had always been used to digitising the photo information
and producing my own final drawings with reference back to the original photo, but this team
work saved time and was very efficient, especially as we were all working in the same office
and could consult one another to ensure accuracy of mapping and to include the ground
survey evidence, which was also in the form of computer output.

An example of the interaction of aerial and ground survey at its best occurred at a complex
settlement and agricultural site at Sceugh Farm, Cumbria, NY544299. Field survey mapped
settlement features lying on the edge of an escarpment, which had originally been identified
on aerial photos and accessioned into the Cumbria SMR. An outlying field system and 2
concentric curvilinear ditches which appeared to be contemporary with the earthworks were
mapped from existing aerial photos. Evidence from my own reconnaissance and existing
photography was combined to produce a plot which exactly overlay and complemented the
plot produced by the ground survey. This is illustrated in figure 2.

Detailed interpretation of selected sites, and further reconnaissance, was carried out in the late
summer and autumn of 1990, to answer questions arising from the initial survey and
interpretation project.

The aim of the aerial survey was not the production of beautiful pictures to record, interpret,
map and publish an archaeological landscape, but to identify possible archaeological sites
Figure 2. Sceugh Farm, Cumbria: combined aerial and field evidence

within the pipeline corridor, accurately map their extent and position, integrate ground and aerial survey to facilitate archaeological interpretation, then justify a case for preservation, excavation, geophysical survey, or simply recommend a watching brief during construction. These aims were achieved within the deadlines, which did not coincide with the optimal seasons for archaeological aerial survey. The information was archived in detailed form, a copy of which is held by LUAU. The contract included a provision for publication and academic use of results, and allowed for accessioning of the data into the relevant SMRs.

Fifteen hours were flown for the NWEP project, during which approximately 900 photos were taken covering the pipeline route and its immediate environs. All the data will be made available for general archaeological use when the pipeline has been constructed. It represents a substantial increase in mapped oblique photographic coverage of north west England.
Information Page

APPEAL FOR INFORMATION - CROP CIRCLES

The Wessex Skeptics, a group devoted to the critical evaluation of paranormal claims, is attempting to assess the evidence for the historical existence of crop circles. We would be grateful if as many readers of this newsletter as possible could contact us with their answers to the following questions: (1) Have you ever come across crop circles, either from the air or in the photos that you have studied, and if so for how long? (2) Do you consider it possible that circles could have been appearing throughout history and not been noticed by air specialists?

We would like to hear from you whether you have seen circles or not! All respondents are welcome to a complimentary copy of our report on the phenomenon upon completion. Please write to, or 'phone: Dr. Martin Hempstead, Dept. Electronics and Computer Science, The University, Highfield, Southampton S09 5NH. Tel. (O703) 592825. Any help will be greatly appreciated.

Amiens Colloquium, 1992

There is to be an international colloquium on 'Aerial Archaeology' held in Amiens on 15-17 October-1992. The meeting is in honour of Roger Agache although further details are not yet known. Anthony Crawshaw has offered to hunt for further information and has suggested the possibility of joint travel arrangements should enough people be interested. Please contact him if you are, or might be, interested.

(15 Kings Staith, York, YO1 1SN)

Air Reconnaissance in Roman Britain 1985-90

Contributions are invited to enable the compilation of another in the series of occasional reviews of new aerial discoveries in Britannia. This will be modelled along similar lines to the last review in Britannia 18, 1987. Contributions are expected to '...be descriptive, not mere lists, and selected photographs may be included...'. Final copy date is 30 June 1991 but (as ever:) earlier is better. Further details are available from David Wilson, CUCAP, Free School Lane, Cambridge, CB2 3RF or Gordon Maxwell, RCAHMS, 54 Melville Street, Edinburgh, EH3 7HF.
Starfish Sites

Anthony Crawshaw

Is this the start of Aerial Underwater Zoology? If so, it is likely to be its finish, given the editor's sniping at Aerial Botany in AARGnews 1.

Should you have heard my evening piece at the 1990 AARG, and stayed awake, you would know that this is nothing to do with Zoology. For the sleepers, or boozers, Starfish sites are the diversionary fires set up close to towns and strategic sites in World War II. The sites were intended to draw enemy bombing away from the target and on to themselves. For York the site consists of seven irregular ovals at random spacings surrounded by ditches to prevent the decoy fires from getting out of hand. These ovals could be mistaken for prehistoric enclosures, particularly if ploughed out.

Since there were 235 Starfish sites constructed all over the country it is possible that others may have seen them also. Given too that York was a small site and that the enclosures were not always oval, I would suspect that a number have been recorded as older archaeology than they are. By the time this note appears in print I should have a slide of Air Ministry maps showing the locations, country-wide. If you think you have found a Starfish site, contact me for details of those in your area.
Wartime Map References

Anthony Crawshaw

Whilst doing the documentary research on the Starfish sites, it became apparent that the grid references in the files didn't fit the present system. Thus, 27/108673 is the reference of the York Starfish site, which is SE637475 on the present system, or 53°55'10"N, 1°1'50"W. If you should find yourself in the same quandary then read on and you will save yourself a lot of time.

This time is spent asking others for advice, since each enquiry goes through several stages:
   a) The person you ask teaches you to use six-figure references;
   b) They inform you that there is a two-number alternative to the currently used letters, eg 44 for SE;
   c) They blame metrification - unjustly as the 1:50,000 First Series used the same system as its immediate predecessor;
   d) They wonder if the mystery figures are derived from longitude and latitude - unlikely, see example above;
   e) The smarter ones suggest encryption, since the documents were classified - also unlikely, as I was looking at the originals from the department concerned.
   And, finally;
   f) They don't know anyhow.

The answer is that the National Grid system was indeed changed, when the 1" map size was changed, just after World War II. The pre-war maps, the Popular Edition, generally didn't have the 1km grid lines printed on them, but wartime and just post-war maps can be found with such a grid printed on them. Such maps don't have the grids aligned with the edges of the map, as at present. A further complication arises from the fact that the grid lines aren't even parallel from one system to the other, so there is no simple arithmetic translation between the two. The only common factor is that they both use 1km grids.

If you should come across references on the older system, I have some of the overprinted maps. Please feel free to ask; I may be able to help with a transformation between the two.
Approaches to Classification

being a slightly modified version of that presented to AARG 1990

Rog Palmer

Classification of our aerial evidence has been the subject of many - some say too many - AARG sessions over the past ten years as well as papers in various journals and recently with the publication of RCHME's ...guide to classification... known now as 'MORPH' (Edis et al 1989). This note is not intended as a critique of 'MORPH' - which may prove to be an adequate sorting method (the reason for its creation) - but more a reminder that there is a wide range of archaeological questions which need a much broader approach if we are to attempt to understand the past using aerial evidence as our primary source of information. There has been a tendency to think that classification itself will provide understanding - it might do, but it will be of a very shallow kind. Much of the aerial evidence cannot usefully be classified and with these parts I maintain that more valuable explanation will be derived by studying associations of the mapped features at a scale which is broader than 'the site'.

I write as one who uses aerial photography to provide evidence of past settlement and landuse. The role which my interpreted and mapped information plays is to provoke thoughts on how the various components might have functioned in the past within a cohesive system. Achievement of this goes beyond the simple categorisation of features. The elementary flow diagram (figure 1) attempts to put things into perspective. I remind you that our overall objectives should be to make archaeological comments not neat and tidy lists of selected shapes, however well defined - although this may be a way towards achieving an elementary level of commentary. Many AARG members are involved at the data collection level; some of us have played with data analysis; there have been attempts at evaluation, but hardly any archaeological interpretation. With a considerable proportion of the country mapped - to whatever level - more work is being carried out now in the analysis and sorting of that evidence.

Doran and Hodson (1975, 158) offer a brief description of the purpose of classification: 'Two main purposes are generally stressed: the summarisation of data for descriptive purposes and a means of generating fruitful hypotheses.'

It is towards the first of those two points that most of our efforts to date have been directed: we have virtually exhausted our supply of 'easy to group' sites (the henges, ovatey-things, Roman this-that-and-the-others) as a glance at the CUCAP index will show and now MPP is making fresh, but in my opinion valueless, demands on the aerial record. However, even at this basic level we have not fully fulfilled our aims as there have been very few working definitions of feature types which may be applied elsewhere. Indeed, in some cases we may even be unaware that definitions exist as was shown by Terry James's publication (1990) of
what he misnamed as 'concentric antenna enclosures' - misnamed because its entrance ditches are parallel and not antennae (these latter are typified at Little Woodbury and Gussage All Saints). In Wessex these sites would have been slotted into the 'banjo enclosure' category - indeed many show more characteristics of the type than do most Wessex banjos! In this particular case we do have a definition, albeit hidden in a local journal and, had he looked, James would have found 'his' enclosures already defined by Perry (1982, 58-9) - and his entomological knowledge would have remained unquestioned! [In this particular case the term 'banjo enclosure' is misleading since their definition necessitates them to have not only an (inner) enclosure but also a specific entrance form and a tendency to enclose beyond this entrance: an elementary multi-attribute definition.]

Let's forget classification as such for a while and look briefly at 'archaeology'. Study of the past is dominated by two linked things: excavation and 'the site'. The keyword would seem to be 'detail' and even branches of the discipline which appear likely to consider, on at least equal merit, what went on outside the immediate 'site' find that lack of data puts this kind of study very definitely in bottom place. (The so-called 'spatial archaeology' acts from the micro level through the site itself to 'off-site archaeology', this latter dealing almost exclusively with artefact scatters.) Perusal of the literature - mostly arising from 'site' excavation - would seem
to relegate anything but the 'site' itself to an uncommented upon map (traditionally 'Figure 1'), an environmental report (use of which is made in discussion), or theoretical aspects (Cunliffe 1984, fig 10.2). Use of the aerial evidence in conjunction with excavation rarely strays too far from the site itself. It might sometimes extend sideways, to compare other similar types of site - if indeed these similar sites can be readily identified (Mercer 1980: albeit done in reverse!) - or to discuss, retrospectively, a small area around the excavated site (Bowen 1979). Occasionally aerial survey is used at the beginning of a project (Drewett 1982) and can serve, as it ought, to direct field research. (HBMC's major survey of the north west wetlands has the ability to proceed in this manner). Mainly, however, we of the aerial world are also site orientated in our consideration of both the evidence and the past.

Much of our recent and current use of the aerial evidence is strongly SMR directed (and MPP is really just an extension of that). This is not too surprising when you consider the number of AARG members employed within county organisations for which the aerial record forms the largest and certainly the most undigested part of the archaeological record of many counties. Without some elementary classification beyond the ubiquitous 'cropmarks' any useful assembly or retrieval of a county's aerial information is an impossible task.

It was towards this basic classification that MORPH was designed: 'Its central aim was to produce a classification system for cropmarks that could be used in the MPP' (Edis 1989, 1.1) although - my own view - with little thought to archaeological problems that the aerial record presents us with. In most cases we have no idea, other than by shape, what it is we are classifying - there are few factual data on which to hang our classes. At the risk of introducing yet more jargon, it is a 'relative classification' that 'MORPH' is producing, and any attempt to realise an 'absolute classification' must integrate results from fieldwork on a classification design which has been created for, or from, archaeological questions. Implicit behind the reasoning of 'MORPH' users might be the thought that if we can classify our data there will be no problems left to deal with. A bit unkind maybe, but some work has been intended to stop at that point, particularly that funded by our official bodies. Rowan Whimster's publication of what was originally called the 'Cambridge cropmark project', funded by HBMC and RCHME, gives the aim of its classification as to allow '... evidence from levelled crop and soil-mark sites to be incorporated systematically within national and county archaeological records.' (Whimster 1989, 27). I reluctantly accept that this might be a valid aim in itself, but I do not see it as one of much help to understanding our past. Within the two areas studied Whimster realised that a simple morphological analysis could be useful with his apparently isolated Marches enclosures but that it would be 'less rewarding' with the Trent valley complexes. Agreed! And it is with that kind of feature that I will be more concerned.

Looking back over past attempts at classification of aerial features my main impression is to wonder if we would ever do the same thing twice. No doubt 'MORPH' intends to do away
with such doubts, but looking at my Danebury figures (Palmer 1984, figs 3, 5-12) and Whimster's Marches enclosures (1989, figs 22-28) makes me wonder....

Perhaps it all goes back to the (?my) earlier arguments for classification when I likened the aerial material to artefacts and suggested that we might treat it in similar ways. This may all very well when we deal with single artefacts (ie back to the 'site' again) although even here we followed a simplistic approach and rarely, if ever, developed any multi-attribute definitions for the aerial features. I now have further doubts as to the validity of using this approach to sort the bulk of our aerial record, for one very simple reason - fashion.

The concept of classification of aerial features (or 'the countryside') pre-supposes that there were fashions in enclosure form. We believe this to be so for certain early 'ceremonial' structures - the neolithic causewayed enclosures and henges - which are found widespread over much of Britain and have a restricted range of forms which normally allows confident recognition and identification. Burial traditions of that time (and the bronze age) were also fashion conscious in internal deposits and external form, varying in structural materials as dictated by local geology while maintaining a generally uniform similarity of structural design. How, or why, these almost 'national' traditions came about or continued is unknown (and doesn't much matter either). By the end of the bronze age it may be possible to identify distinct local traditions in domestic and funerary structures - again, to some extent dictated by geology, available materials and (perhaps) economic factors. And we can see structures and associations in (eg) Wessex that do not occur in other lowland areas or in northern Britain.

From this time onwards, if the aerial evidence is to be subjected to analytical games it becomes logical that this be undertaken within 'local' and geographically distinct areas rather than on a country-wide basis. On the other hand, some types of structure may be newly recorded in places beyond their previously known territory, as with the Welsh 'banjo' enclosures previously mentioned.

We have some early prehistoric similarities in earthwork design - but why not more similarity in later periods unless it wasn't important? Possibly we are being misdirected by looking at overall shape when no similarities were intended by their makers, and this latter would need to be the case for us to use this attribute to make a valid classification 2000 years later.

However, we can again learn from non-aerial archaeology. When studying (mainly) artefacts to define 'cultures' Childe pointed out that some items particularly tools and weapons may be unreliable as indicators of ethnic identity as utilitarian value would cause the good ideas to spread rapidly from one group to another by trade or imitation (Childe 1929, 248). The same may be true of satisfactory designs of enclosure features, particularly their entrances when, for instance, one of their principal functions concerned stock management. With iron age hillforts this is an accepted tenet and we see widespread use of a datable series of standardised defensive entrance outworks (Cunliffe 1974, 238-250). Ought we not, therefore, expect repetition of parts of features, but not necessarily of the wholes?
Which brings us back to classification, but in a functionalist way rather than a purely morphological one. For this approach I maintain that analysis of the map is of first importance and that the study of associations is of equal significance to the recognition of specific parts of features. Individual 'sites' become of minimal significance and the overall shape of an enclosure of little importance by itself.

It will be apparent that this approach does not do away with some elements of 'straight' classification but is selective in its attribute choices. But the questions it seeks to answer are more concerned with past activities over areas of land than with individual features within those landscapes. For this I am advocating a much more general approach in an attempt to understand those activities. When a level of understanding has been reached it may then be appropriate to call attention to specific features within 'working units' as possible key points for seeking further information - most likely by fieldwork.

Air photography is best at showing landscapes, within which individual features are incidental. Having mapped our landscapes, should we not analyse by looking in from them? We may have, for example, a mapped area within which systems can be isolated (eg, by alignment, through division by natural features such as ravines or soils, by change of type, etc). Each system (albeit partially recorded) can be further broken into components (such as fields, tracks and 'settlements'), identifiable as entities, but not necessarily as discrete entities - ie they relate to other parts of that system and, in some cases, a relative chronological assessment can be made of these relationships. Bowen's (1990) analysis of the Bokerley Dyke area began in this way, and the key to his understanding was the network of linear ditches which led, in turn, to the arable fields and the enclosures. Riley worked in a similar way - from the fields to the enclosures - in his _Early Landscape _research (Riley 1980). Advances may therefore be more apparent if we were to concentrate our analyses on the 'busy' areas of the country before moving to those apparently discrete enclosures which can only be grouped through similarities in their form and location.

Some components can be further divided, perhaps usefully in the case of clear multi-phase successions (as in 'complexes'), but sometimes only as a means of sub-identification as when an enclosure containing pits and splodges may be prefixed with 'settlement' to add further definition (if usually chronologically unverifiable from the aerial record) to that particular feature. Other sub-divisions may relate to entrance styles (again!). Those on the Wessex chalk appear to include a small number of formalised and repetitive forms which offer a valuable attribute through which to additionally define an enclosure. It is the repetition which makes them of value - a one-off case is of little help in structuring a system of classification. In many cases further division, or extraction of attributes, may best be left to a secondary stage of analysis as a major step towards a basic understanding of our past landscapes can come from simply identifying, and linking, past agricultural systems to their access routes and settlements. That these may be square, round or maculate is not of primary importance.
Air photo-archaeology is not concerned with pretty pictures or necessarily in isolating types of site although the latter may assist or be part of the 'great design' through which air photography can add structure and material and economic substance to the archaeological population of the country (especially Britain and parts of western Europe) which exists at present as 'cultures' defined almost wholly _via _their tools, small artefacts and burial traditions - while their 'village plans', agricultural systems and communications are given scant and separate acknowledgement and tend to remain unrelated to the people who designed, constructed and utilised them. Air photo-archaeology has the potential to provide the rural settings contemporary to those artefactual cultures.

References

Bowen, H.C. 1979. 'Gussage in its setting', in Wainwright, G.J. Gussage All Saints: an iron Age settlement in Dorset. London


Childe, V.G. 1929. The Danube in Prehistory. Edinburgh

Cunliffe, B. 1974. Iron Age Communities in Britain. London


James, T. 1990. 'Concentric antenna enclosures - a new defended enclosure type in Wales'. Proc Prehist Soc, 56, 295-298


Riley, D.N. 1980. Early Landscape from the Air. Sheffield.

The Purpuse of Crop Mark Analysis

by Richard Hingley

I am writing this contribution to the newsletter with a certain degree of trepidation. The detailed discussion of ten years ago never really helped to progress the subject, and I suspect that any renewed discussion will prove equally sterile. Nevertheless, I intend to present my own personal view on aerial archaeology and classification (1).

My view is that the purpose of archaeology is to reconstruct the way of life of past societies. We should aim at an understanding not only of the material culture of these communities but also of their thoughts and beliefs. Archaeologists should not merely aim to create a vast collection of artefacts and observations about them and their contextual relationships. Archaeological evidence is only of value if it assists us to understand past societies more fully.

The need for integrated archaeological survey

Aerial archaeology is one of the investigative techniques available to archaeologists which, as a specialized technique, has its own particular methodology; it is one of the methods that assist the archaeologist towards an understanding of past societies.

There are a number of other techniques which complement aerial archaeology: excavation, geophysical survey, earthwork survey and surface artefact scatter survey. These methods are complementary, as they produce differing types of information at differing scales of analysis and each has a differing range of biases. Excavation, for instance, can provide detailed information about settlement form and the chronological sequence of settlement on a particular site. Excavation, however, is a very expensive and labour-intensive technique and, consequently only covers restricted areas. Aerial photography and surface-scatter survey can cover large areas cost effectively, although they have a range of associated biases. We understand something of these biases; therefore, excavation, aerial photography and surface-scatter survey should be used in a complementary and critical fashion. These techniques can build an understanding of the spatial organization of past societies through an analysis of their landscapes.

Figure 1 shows a range of crop mark enclosures in Warwickshire examined during the period 1985-1989. An attempt was made to examine a range of enclosures on the assumption that they represented the ditches around early to middle iron age enclosed settlements (Hingley 1989). The evidence from the majority of sites that were field-walked supports this identification (Figure 16, c and e). In addition the excavation in 1987B of enclosure d indicated that it represented a middle iron age enclosed settlement. One site is evidently more complex (Figure 1a), as the pottery scatter was found to be external to the enclosures.

I would argue that surveys of this type are particularly useful and that more intensive surveys involving the full range of available techniques are required if we are to put the mass of crop mark evidence for Britain into context.

The nature of archaeological analysis

I would argue that the best types of classification are those that are problem orientated. Information is incorporated within the archaeological record; however, we require ideas in order to unlock what this information means.

I attempted to explore this idea at AARG around ten years ago through reference to biology and evolutionary theory. Distinct 'types' of animal, such as cats, dogs, cows and horses, have been observed by human communities for millennia. Such types only take on a significant relationship to one another if they
Fig. 1 The relationship of cropmark enclosures to surface material

Fig. 2 Model of a hypothetical Banjo Enclosure
(Scale is approximate)
are given a context within a genetic evolutionary theory, such as that developed from Darwin's *The Origin of Species*. Other culture-dependent classifications appear to be nonsense to a present-day western observer.

A purely observational classification may have very little value, as categories/types have limited significance and boundaries between them are blurred. Foucault has discussed a classification from a fictional Chinese Encyclopedia in which animals are ordered into the following classes:

(a) belonging to the Emperor; (b) embalmed; (c) tame;
(d) suckling pigs; (e) sirens; (f) fabulous; (g) stray dogs;
(f) included in the present classification;
(i) frenzied; (j) innumerable; (k) drawn with a very fine cameihair brush; (l) etcatera; (m) having just broken the water pitcher; (n) that from a long way off look like flies.
(Foucault 1970, vx).

This classification takes into account a particular view of the world. Whether or not an animal is embalmed or frenzied has little importance in the understanding of genetics; while distinct classifications would have to be set up in order to understand factors such as ownership (belonging to the Emperor), or state of mind (frenzied). There are a whole variety of confused ideas and approaches behind this single classification.

I would argue that classification in archaeology should be constructed on a sound theoretical basis. To justify this claim I would observe that all classification is based on theory in any case and that we have a duty to make the assumptions behind our work clear.

The RCHME classification of crop marks is based on at least two assumptions:

a) that basic types (eg enclosures, linear features, linear systems, maculae) are more fundamental than the elements constituting the types (eg the individual lengths of linear ditch which form enclosures or the individual pits within a pit alignment).

b) that basic types are somehow more basic than groups of types (eg enclosure systems, and complexes including enclosures, linear features and maculae).

I must emphasize that I do not see this as a criticism of the RCHME approach; the above merely reinforces the point that any classification is derived from a particular set of assumptions and is not objective.

All classification is subjective, but what form of subjective classification should we aim for? I would argue that a particular classification should relate to the particular type of problem that it addresses and the scale at which a particular problem can be answered. Thus if we wish to study the division of labour within a single household, we should study the organization of domestic space (household space and settlement space; 2). If we wish to study political organization we might choose to examine systems of settlement and attempt to isolate central places from which any elite wielded power (this would require landscape analysis; 3).

An example of an alternative analytical framework

What, therefore, do we wish to examine in the archaeological record? Different people wish to study different topics: pottery production, house farm, crop mark morphology, gender relations and political systems, etc.

For the analysis of the iron age I have suggested elsewhere that we can gain an understanding of society through an analysis of patterns of settlement and associated evidence for land-use. I have suggested that groups which exploited
Fig. 3 The Lower Windrush Multiple Settlement
particular agricultural resources in common provided the basis for social and political organization (Hingley 1984, 1988). I do not wish to explore this in detail, but I shall discuss briefly a simple model for settlement analysis enabling an alternative approach to aerial photograph analysis.

I have suggested two types of economic system based on two farms of exploitation of the landscape. In the Oxfordshire Uplands isolated enclosed settlements represented isolated productive units. Each settlement incorporates a division between arable and pasture which is expressed clearly in the spatial farm of the banjo enclosure (Figure 2).

The open/ unenclosed settlements of the Oxfordshire Thames gravels form a clear contrast, and I have argued that these were integrated into larger-scale cooperative groupings which held some resources in common. The model which I developed has been discussed further by Lambrick (1990) and can be characterized by a group of settlements, the Lower Windrush multiple settlement (Figure 3). It would appear that this multiple settlement formed a system of landscape organization incorporating at least seven early to middle iron age settlements (4). At the centre was an area of communal pasture located on river terrace gravels. The settlements formed a division between the communal pasture and the arable land; the arable land was situated on the edge of the gravel terraces and in close proximity to the settlements.

If this model is correct, the Lower Windrush multiple settlement formed a cooperative association of settlements. It appears from the nature of the settlement pattern that the central area of pasture was held in common between the seven individual communities, although each individual settlement would have held a discrete area of arable land.

Other multiple settlements appear to be common on the gravel terraces of the Upper Thames Valley. These multiple settlements with common pasture farm a very distinct type of landscape organization from the single economically discrete communities of the Oxfordshire Uplands (see Hingley 1988 for further discussion).

For the purpose of understanding agricultural production and social organization we should look at the position of individual settlements in their landscape setting. In the Oxfordshire Uplands the individual settlement forms a logical unit for analysis. In contrast, on the gravels of the Thames Valley, groups of settlements held important resources in common and the individual settlement in this area cannot be understood in isolation from other neighbouring settlements.

**Future approaches**

A different approach to analysis is therefore necessary. The individual settlement can only be interpreted in the context of its associated natural resources and neighbouring communities. I would suggest that it will be necessary to adopt this type of classification if we are ever to gain a comprehension of iron age agricultural and social organization.

With the advent of Geographical Information Systems (GIS) it should be possible to assess models such as that developed for the Upper Thames Valley in a more sophisticated manner. It is naive to assume that the study of archaeological evidence in isolation will provide the answer to problems of landscape analysis. The multiple unit settlement model suggests that groups of individual communities held pasture in common. This common resource is defined by a range of factors. The settlements lie close to the edge of the terrace gravel and have the most fertile arable soils in close proximity. In order to build and assess sophisticated models of landscape organization we require information about the nature of past settlement but also evidence for soils and topography.

In well researched areas such as the Upper Thames Valley all of this information is available to us. GIS is a particularly important technique, as it will permit the full integration of various forms of graphic information including all
those discussed above.

Classification, research and preservation
This type of perspective should be taken into account in the development of excavation strategies and preservation policies. We excavate in order to collect further information for past societies, and we protect sites to preserve a sample of archaeology far future generations on the assumption that they will be better able to understand what this evidence means. We must improve our theory as well as our techniques if we are to choose the best sites for excavation and preservation.

It can be argued that we should aim to preserve, for example, at least one complete multiple settlement on the Upper Thames Valley gravels. This landscape unit includes the settlements, but also the central area of communal pasture and the outer areas of rough pasture. Such a preservation strategy would involve a whole settlement system with its associated resource areas. By contrast, in the Oxford Uplands it may be adequate to preserve single settlements, as these incorporate the same division into arable and pasture but at the scale of the single settlement rather than the landscape.

I would argue that, if the RCHME classification is to be of use in research and preservation strategies, it will be necessary to broaden the framework of analysis to incorporate other forms of archaeological information and evidence for landscape patterning.

Notes
1. This discussion is my own personal view rather than the official policy of Historic Scotland.
2. Much of this information would only be available through the excavation of well preserved sites.
3. Landscape analysis requires the use of evidence from aerial photography and field survey in addition to excavated evidence.
4. Four of the sites that make up the Lower Windrush multiple settlement have been excavated (these are shown as Linch Hill, Aerodrome Site, Gravelly Guy and Beard Mill on Figure 3). Lambrick has discussed the recently excavated settlement at Gravelly Guy and has tentatively suggested that it might have consisted of six individual households occupied over a period of time. The other three settlements are unexcavated.

References
LAMBRICK, G 1990, 'Farmers and shepherds in Bronze Age and Iron Age', Current Archaeology, 11, 14-18.
Towards 'Understanding' : the next steps?

J N Hampton

The last two decades have seen the development of cartographic techniques designed to present the wealth of archaeological evidence collected by half a century of air photography. The need to synthesise the information contained in many hundreds or even thousands of air photographs for a given area into map form is now widely understood: but there also exists a tacit assumption that these maps form the basis for new studies, designed not only for the processes of planning and preservation, but also towards 'understanding' the archaeology they present. To achieve both objectives it is necessary to associate the air photograph evidence with the information to be derived from the whole range of archaeological and historical sources, including the land itself. For example, the CBA in Research Objectives in British Archaeology (Thomas 1983) refers to 'Air reconnaissance.. integrated in an overall programme of exploration.' Whimster (1989), in sampling two contrasting areas, highlights the differences between an upland area of the Welsh Marches and a lowland river valley, and endorses (p 65) the need for further research including field survey and documentary research. It is likely that across the country the problems associated with further research have broadly similar strands, although differences in geology, landform and settlement will require differing emphases of particular aspects.

This theme of further research, stimulated by maps of evidence from air photography, was presented to the 1980 CBA symposium (Hampton 1983; Palmer 1983) and Fowler (in Palmer 1984) made a special point of such needs. In Nottinghamshire, Riley (1980) successfully incorporated the results of trial excavations expressly conducted to identify the date of air photograph features, although an earlier presentation for fieldwork and further research in Wiltshire of a block of some 36 sq km (Hampton and Palmer 1978, figs 7-11) comprising settlements, field systems, etc produced minimal results. However, Wilson (1987, 22), citing complaints by 'aerial archaeologists' that the implications of aerial reconnaissance are ignored by their ground colleagues, calls for 'effective publication'. Yet, of the admittedly few maps published to date, none appear to have prompted more than select excavations and none, as far as the writer is aware, have resulted in wide ranging multi-disciplinary enquiry to establish not only how the archaeological landscape(s) worked, but also the nature of subsequent land use and its effect on what has survived and our judgement of the past.

It is tempting to see in this apparent lacuna symptoms of wider significance. Perhaps in archaeology, with its historical emphasis on vertical stratigraphy, there is a reluctance to recognise the importance of horizontal pattern and relationship. Similarly, in spite of increased funding for 'landscape projects', it is a matter of conjecture whether the wide range of multi-disciplinary enquiry needed to unravel complex issues of this nature is fully appreciated. Indicative of these attitudes in the late 70's was the almost extraordinary decision to fund a major research project in the Fens without previously mapping the
specialist archaeological air photograph evidence (Palmer 1990). Generally there seems to be a failure to appreciate that in the few areas where air photograph evidence has recorded almost contiguous settlement patterns, there also exists potential for isolating contemporary landscapes: and for areas with dispersed settlement, whilst the objectives may remain the same, similar studies will be more difficult and probably require different and perhaps more sophisticated techniques. The response to this situation is to consider now what the research aims for the next decade or so should be, and how they can be attained.

It will doubtless be argued that, at the present state of our records and resources, vis à vis the air photograph archive, the first stage is to note at medium scale all the air photograph evidence. That this priority is approaching completion - albeit to varying standards - offers an opportunity to consider 'the next stage'. Clearly we can continue ad infinitum to develop and manipulate the existing records and of course these processes are likely to provide guidance for future work: but this writer is arguing for a conceptual leap forward. Firstly, we should use the strengths of 'aerial archaeology' to direct studies to areas where amenable soils and reconnaissance have produced vast amounts of evidence which may provide a basis for, a) unravelling the complexities of several millennia of landuse and, b) identifying how, say, a late Iron Age landscape actually worked. Pilot multi-disciplinary studies with these objectives in view seem desirable in a range of geographic situations, perhaps including dispersed settlement areas.

The enquiry recorded by The Archaeology of Bokerley Dyke (Bowen 1990) was not stimulated by a preceding map of the evidence from air photography, but by a desire to 'understand' the nature of a particular landscape feature. Air photographs were merely one, important, strand in the enquiry which utilised a variety of research tools appropriate to the Wessex chalkland. It can be reasonably claimed that this volume, without use of sustained air reconnaissance over nearly a decade, would have been substantially different: but the use of this and other techniques such as analytical and geophysical field surveys, excavation (both past and specifically designed - and including a gas pipeline) and documentary research illustrates the range of enquiry needed to 'understand' a linear feature about 6 km long. That this should also involve a need to assess patterns and relationships, both spatial and chronological, over an area of some 315 sq km is hardly surprising, for it is precisely the extent of the overview that makes such studies possible, and this in turn has wide implications for the resources required for landscape studies. But even in such a wide ranging enquiry it is, in the case of earthworks, the stratification of detail (Bowen 1990, 50) and, for air photo interpretation, pattern and relationship (ibid, 21-24) that provide, in association with the wider pattern, the chronology for the essential building blocks of the study. Apart from these technical considerations there remains one outstanding factor: the organisation of the enquiry. In this particular case the main responsibility fell on the shoulders of one man, Collin Bowen. How many Collin Bowens are there with the vision, knowledge and skill to form the cornerstone of such an enterprise and, should we ask, how many similar studies are desirable and, are the resources available? Perhaps the measure of 'those monuments especially worthy
of preservation' as provided by this study is not an insignificant factor and, whilst such studies can consume time and resources, we are dealing with a chance selection of the evidence, most of which lies beneath the plough line. It is all we have, and therefore deserves our best.

Bowen has gone some way to dissecting the landscapes in the vicinity of Bokerley Dyke: Palmer, too, for the Danebury area (1984) offered some provisional divisions by period and type, and both suggested a range of research requirements for future action. Clearly before more detailed period assessments can be made there is a need to establish contemporaneity within the elements that comprise what is essentially a cartographic inventory. And, once a degree of contemporaneity has been established between a group, or groups, of features then comes an exciting opportunity to evaluate how the landscape might have worked. Although perhaps most areas in the Lowland Zone will require research à la Bowen before proceeding to this latest stage, there are a few situations which for one reason or another have limited spans of occupation - such as, say, the Roman Fenlands: for these the potential for identifying a working landscape looks good.

It is well known that specialist air photograph interpretation can produce assessments appropriate to that speciality: for example geology, forestry, demography, transport, hydrology and even archaeology have benefited by the use of air photographs. Perhaps less widely appreciated is that a combination of such studies, in lieu of other sources, has the potential of providing a measure of a society's economic and administrative structure. Were this tactic, with a team of specialists using disciplines appropriately modified, applied to a map of archaeological evidence, it might be that we could begin to 'understand' the workings of a landscape in a defined period of the past.

With these aims on view it might be possible to envisage pilot studies for a few areas selected because, inter alia, of a limited date range. The analysis would utilise not only the mapped archaeological evidence, including of course pattern and relationship, but also all available background information: it would almost certainly generate further momentum in particular aspects of research. Initially the analysis might include aspects such as landform, soil potential, weather patterns, landuse (recent and past), natural resources, agricultural practices of all periods, production potentials, ethnographic parallels, settlement patterns and population densities, communications related to periods, historic documentation, boundaries, etc. Such a compendium of analysis is clearly beyond the expertise of one person: rather it is seen as a co-operative multi-disciplinary enquiry between specialists co-ordinated to achieve particular objectives. It will be noted that many of the avenues of enquiry noted above are already used at one stage or another in research projects covering the landscape. What is significantly different is that in this latter case, as in the photo interpretation teams, each specialist is required to identify the effect of his or her speciality on the problems of the area in an interactive process.
What then should AARG be doing? In the writer's view, looking forward toward identifying and developing techniques and studies that will promote our understanding of the palimpsest that is our record. Studies such as those outlined above may, or may not, in the long term, offer significant advances, but the first stage is to discuss the issues and assess. Essentially AARG is the only body familiar enough with the combined problems of aerial archaeology and landscape studies to consider these matters in depth, and it is hoped that this outline of methods for the multi-disciplinary examination of problems associated with landscape studies will promote comprehensive discussion.

Bibliography


Palmer, R. 1990. 'Air photography and the Cambridgeshire Fenland Survey', *Newsletter of the Aerial Archaeology Research Group* (June 1990)

Riley, D.N. 1980. *Early Landscape from the Air*, Sheffield.


Wilson, D.R. 1987. 'Reading the palimpsest: landscape studies and air-photography', *Landscape History* 9, 5-26
Collin Bowen is an educational joy to be with in the field and my debt to him in my formative years merely adds me to a long list of students of field archaeology. I was employed by him on a short-term contract an unmentionable time ago to undertake the initial air photo interpretation for Bokerley and its appearance is doubly welcome: it presents analyses of the archaeology of an area by the person most qualified to do so and it shows just what can be achieved through sympathetic use of the aerial evidence. One aspect which surprised me - although it ought not have done - was the considerable increase in numbers of features recorded from the air since my work in the area. These came as much from the Dorset side, which had been the subject of intensive reconnaissance by CUCAP and RCHME in the 1960s and 1970s in conjunction with investigations for the county inventories, as from the 'newer' Hampshire parishes.

I will restrict my comments to the aerial aspects of the volume and, from this point of view, I see it as one of the most important books yet published. It is not an easy book to read - essentials include a large and empty table on which to spread maps and a good memory for numbers - but once beyond the section on Bokerley Dyke itself the real meat of the book is met. The reader is taken, with the help of a set of Area Plans, through a contrasting series of archaeological landscapes and given explanations drawn together from field work, examination of aerial photographs, and other documentary sources. Bowen's thesis is that the 'Bokerley Line' was a cultural division from the middle bronze age onwards, and this he demonstrates by examination and comparison of features on both sides of the Line. Part IV of the volume, a review of monuments east and west of Bokerley Dyke, will be of particular interest to those of us who play morphological games. Its wisely hesitant approach suggests that there is as much, or more, to be gained through study of features and associations as from shape and size. To me the book is a model of what can be achieved using the aerial evidence supported by other methods of investigation. Yet it is a 'one off' - there are, to my knowledge, no other current projects which approach the depth of understanding that Bokerley has attempted.

Despite the praise, there is a disappointing side to Bokerley. The field staff of RCHME excel themselves in the investigation of earthworks and are fully supported by a trained and competent drawing office but on the aerial side the work in Bokerley has glimmerings of the amateur. I hope this is due to the final drawing rather than the interpretation, although where photographs can be compared with Area Plans (eg Plates 17 and 18 and Area Plan 2) important differences leap to the eye. The conventions used, too, are typical of the Commission in the '70s and do not incorporate the (largely in-house) suggestions published in Aerial Archaeology (Volume 11, for 1985). That volume, my old Danebury, itself published by RCHME as was Rowan Whimster's Emerging Past, shows what detail can be portrayed.
at various scales: Bokerley falls disappointingly short of these standards. We must ask why. Why does Bokerley content itself with (apparently) scribed drawings using constant width lines and failing, even at the published scale of 1:5000, to show the true shape of features? Why were the drawing office allowed to revert to inadequate and sometimes confusing conventions? And most importantly, why was there not an APU presence in what is largely an aerial volume - why was not one person seconded to the Salisbury office to produce interpretative drawings to the best standards possible?

But forget these niggles - think yourself back to the ’70s, read, be inspired and copy.

Rog Palmer


Any record of conference proceedings, unless strictly thematic, is likely to be an uneven display of mixed papers and in this volume the contents range from the scenic to the clearly presented technological. The majority of papers (11, or 13 depending on definitions) deal with aerial photography, pure or applied, one describes a re-invention of computer plotting while four are concerned with geophysical survey. Two other papers make use of air photographs as part of the data source, and combine aerial and geophysical results either in the hunt for Roman roads (Hus, Leva and Munaut) or as a means of optimising the mapping of features. This latter, the work of Becker, provides an exemplary display of efficient use of technology through which he is able to digitally process aerial photographs and add the results to those achieved by, in this case, magnetic prospecting. Also from Munich, Peipe writes about the ability to produce orthophotographs from obliques and thus ’...present the rectified archaeological features for a subsequent interpretation and the production of plans by the archaeologist.’ Nice to see someone who appreciates the division of skills! Of possible interest to our own presentation of sites is the paper by Nikitsch who uses aerial photographs to produce plans, small-scale excavation to provide ditch dimensions and combines the two to provide computer drawn perspective reconstructions. This is easily achieved by those of us with access to CAD packages and might well be a useful way of giving the public an understandable picture of past features.

With two omissions and one addition this volume is an almost complete record of the Second (1986) International Symposium and the editorial intent to publish it as such may account for the delay in publication. In 1987 many of the papers would have been fresh presentations of little known information, but by 1990 much seems to be 'old hat' and the inclusion of post-1986 references (in one case, 1989!) in some of the papers clearly indicates those responsible for ignoring editorial deadlines.

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